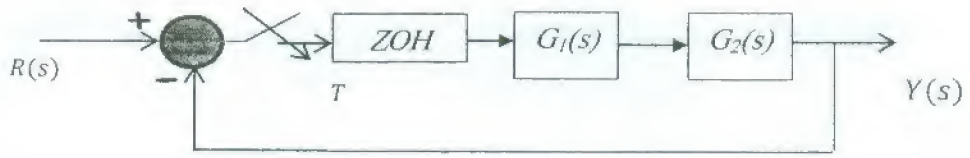
(ii) Determine the system type and steady state error for unit step input.

(Q3)

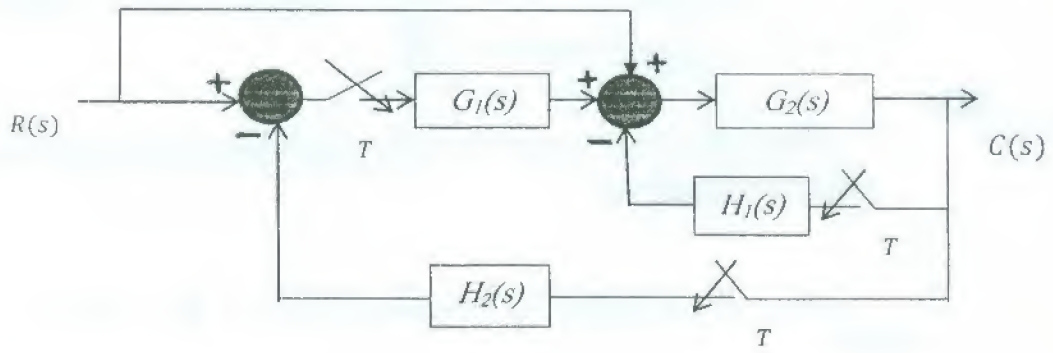
(a) Given a discrete-data control system as shown:



$$G_1(s) = 1 + 10s\,, G_2(s) = \frac{K}{s^2}$$

Find the range of K for the system to be stable using root locus.

(b) For the digital control system shown in figure, determine $C(s)$, and $C(z)$ using signal flow graph .



(Q4)

(a) Consider a linear discrete data control system whose input-output relation is described by the following difference equation:

$$c(k+2) + 2c(k+1) + c(k) = u(k)$$

(i) Determine the state controllability of the system.
(ii) Show that the observability of the system can be changed through state feedback (hint: let $y(k)=c(k+1)$).

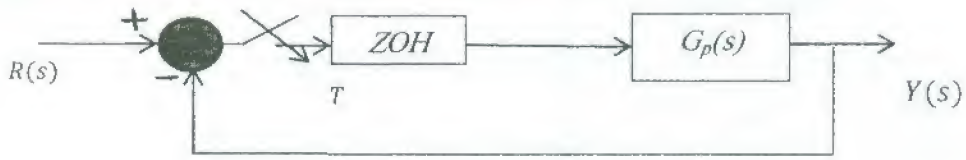
(b) Given a discrete-data control system whose open loop transfer function when $T = 0.5\ sec$ is:

$$G(z) = \frac{1.7788K(z + 0.1153)}{(z - 1)(z - 0.1089)}$$

Determine the range of K for the system to be stable using Nyquist plot. Find the gain and phase margin.

(Q5)

(a) Given a discrete-data control system as shown:



$$G_p(s) = \frac{k(s + 1)}{s(s + 2)} \quad T = 0.5\ sec$$

Using Jury's test, determine the range of K for the system to be asymptotically stable.

(b) A discrete data control system is described by:

$$x(k + 1) = Ax(k) + Bu(k)$$

Where

$$A = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0.5 & 0 \\ 0 & 0 & 2 \end{bmatrix}, \quad B = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$$

(i) Check the system stability.
(ii) Show that the system stability can be changed by using state feedback?

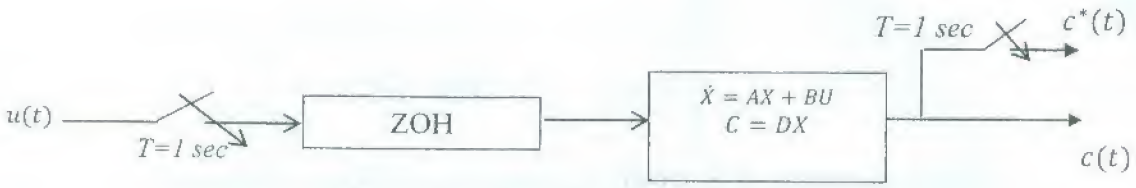
Good Luck

Dr. Ahmed Elmogy

Time function	Laplace transform	Z-Transform
$\delta(t)$	1	1
$\delta(t-kT)$	e^{-kTs}	z^{-k}
$u(t)$	$\frac{1}{s}$	$\frac{z}{z-1}$
e^{-at}	$\frac{1}{s+a}$	$\frac{z}{z-e^{-aT}}$
T	$\frac{1}{s^2}$	$\frac{Tz}{(z-1)^2}$
t^2	$\frac{2}{s^3}$	$\frac{T^2z(z+1)}{(z-1)^3}$

Answer the following questions:

(Q1) For the open loop discrete system shown in figure.



$$A = \begin{bmatrix} 0 & 1 \\ -1 & 2 \end{bmatrix},\ B = \begin{bmatrix} 0 \\ 1 \end{bmatrix},\ \text{and } D = [1 \quad 0]$$

(i) Find the discrete-time state and output equations.

(ii) Convert the discrete-time dynamic equations into diagonal form.

(iii) Find the transfer function $\frac{C(z)}{U(z)}$.

(Q2)

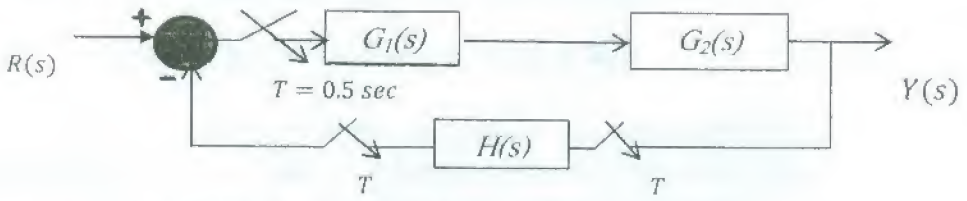
(a) Find the state space model for the system described by the following difference equation:

$$y(k+2) + 4y(k+1) + 5y(k) = 3u(k+1) + u(k)$$

where

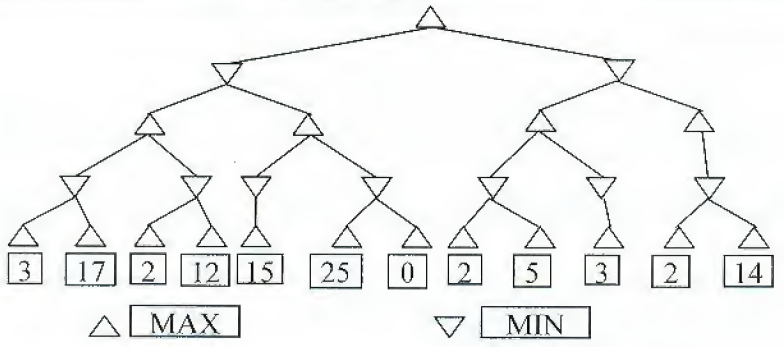
$$y(0) = 0; y(1) = -1$$

(b) For the system shown in figure;



$$G_1(s) = \frac{1-e^{-Ts}}{s},\quad G_2(s) = \frac{25}{s+25},\ \text{and}\ \ H(s) = 1$$

(i) Determine the unit step response *y(kT)*.



(B) For the 8-puzzle problem given below, both the initial and goal states are shown. A tile can be only moved to an adjacent empty slot. It's required to reach the goal state from the initial state.

1. Describe a suitable heuristic ***h*** for solving this problem.
2. Using the heuristic described in part 1 above, trace the operation of a ***greedy best-first*** search to reach the goal state from the initial state. Give each node in the tree a unique number and then ***show in a table*** the sequence of nodes that the algorithm will consider at each step and the ***h*** score for each node.

2	8	3
1	6	4
7		5

Initial State

1	2	3
8		4
7	6	5

Goal State

(C) 1. Explain what is meant by the Big-O notation and how it's used to evaluate search algorithms. Use breadth-first and depth-first methods as examples.

2. What is a relaxed problem and what is an admissible heuristic? How are the two related? Give an example.

(Q3) (32 points)

(A) Convert the following English statements into FOL sentences:

- Ali takes either AI or Database (but not both)
- Ali takes AI or Database (or both)
- Ali takes AI and Database
- Every student registers at least one course
- Every student who takes AI also takes Database
- No student can help all the other students

(B) List the steps for converting a FOL statement into CNF. Apply these steps to the statement below to convert it into CNF:

$\forall x\{ P(x) \Rightarrow (\forall y[P(y) \Rightarrow P(f(x,y))] \wedge \sim \forall y[Q(x,y) \Rightarrow P(y)])\}$

(C) 1. Translate the following sentences into first-order logic:

- Nobody ever lies to a friend of theirs.
- Those who are not honest lie to everybody.
- Bob is not honest

2. Convert your sentences from part (1) into Clausal Form (CNF)
3. Use resolution with refutation to prove that "Bob has no friends".

(D) 1. What is Generalized Modus Ponens (GMP)? How it is used? Give an example.

2. Compare Forward Chaining and Backward Chaining methods for making inferences.

GOOD LUCK

Tanta University

Department: Computers & Automatic Control Engineering
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Artificial Intelligence and Expert Systems Second term 2011	Course Code: CCE3219 Allowed time: 3 hrs	Year: 3rd No. of Pages: (2)

IMPORTANT: ***Make your answers as neat as possible to get extra marks.***

(Q1) (30 points)

(A) For each of the following statements, state whether it is True or False. Explain if False:

1. A model-based reflex agent uses a utility function that maps a state onto a real number.
2. An episodic environment has limited number of distinct, clearly defined percepts and actions.
3. A rational agent is not always successful.
4. Depth-first implements FIFO queue for tracking leave nodes on the fringe of the search tree.
5. Iterative deepening search has a linear space complexity.
6. A heuristic that is good for a given problem is also good for any other problem.
7. Simulated annealing search is used to escape local maxima by allowing some bad moves.
8. An inference procedure *i* is complete if whenever $KB \vdash_i \alpha$, it is also true that $KB \models \alpha$
9. $C \vee D \Rightarrow B$ is not an example of a horn clause.
10. $\forall x$ (Egyptian(x) $\wedge$ Kind(x)) is a correct representation of the sentence "All Egyptians are kind"

(B) Complete the following sentences:

1. Agent = ... + ...
2. ..... agents focus on goal not rules because number of rules can be large which make these agents more flexible but less efficient.
3. Iterative deepening search is optimal if .....
4. A search problem is defined by four items: ....., ..., ..., ...
5. A heuristic $h(n)$ is ..... if for every node n, $h(n) \leq h^*(n)$, where $h^*(n)$ is the true cost to reach the goal state from n.
6. A problem with fewer constraints is called a ..... problem.
7. Crossover and mutation are operators of ..... search method.
8. Space complexity of uniform-cost search is .....
9. The ..... search expands the node that appears to be closest to goal.
10. ..... is a way to get an inference immediately by finding a substitution θ that makes two predicates equivalent.
11. ..... is the procedure that will answer any question whose answer follows from the *KB*.
12. A sentence is ..... if it is true in some model.
13. First-order logic (like natural language) assumes the world contains ....., ... and .....
14. Quantifiers used with FOL are ..... and .....
15. $\exists x \forall y$ is ***not*** the same as .....

(Q2) (28 points)

(A) For the given minimax tree, the evaluation function scores for leave nodes are shown.

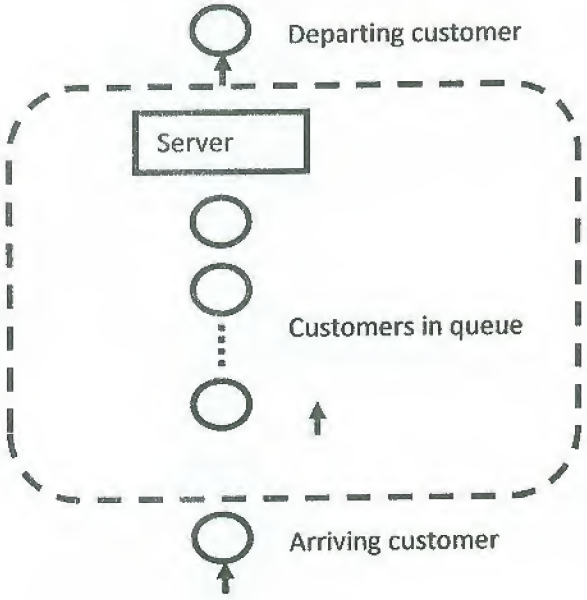
1. Apply minimax to fill the scores for all nodes in the tree.
2. Show the steps for applying α-β pruning and draw the resulting final tree. Give an expression for saving in time complexity gained by applying α-β pruning.

Question 2 (20 marks)

a) Discuss the synchronization mechanisms used in parallel simulation in contrasting the advantages and disadvantages of each one(5 marks)

b) Consider a service facility with a single server (examples are one-operator barbershop and information desk at airport). The inter-arrival times of customers are exponentially distributed independent and identically distributed (IID) random variables with mean δ. A customer who arrives and finds the server idle enters service immediately taking an exponentially distributed IID random variable service time with mean β. A customer who arrives and finds the server busy joins the end of a service queue. Upon completing service for a customer, the server chooses a customer from the queue (if any) in a First-In First-Out (FIFO) manner, see the figure below. Starting from zero customers waiting and idle server, it's required to simulate the system until exactly 1000 customer have completed their delays in queue (15 marks).

i. Suggest performance measures for system study
ii. Draw event diagram
iii. What are the system state variables?
iv. Show your simulation model operations using flowcharts



Question 3 (15 marks)

a) What are the advantages and disadvantages of simulation compared to other methods for studying systems (5 marks)

b) An environment consists of two populations, predators and prey (paradise-host), which interact with each other. The prey are passive, but the predators depend on the prey as their source of food. Let x(t) and y(t) denote, respectively, the numbers of individuals in the prey and predator populations at time t. Suppose that there is an ample supply of food for the prey and, in absence of predators, that their rate of growth is rx(t) for some positive r.(We can think of r as the natural birth rate minus the natural death rate.) Because of the interaction between predators and prey, the death of the prey due to the interaction is proportional to the product of the two population sizes and is given by ax(t)y(t). Where a is a positive constant of proportionality. Since the predators depend on the prey for their very existence, the rate of change of predators in the absence of prey is –sy(t) for some positive s. Furthermore, the interaction between the

two populations causes the predator population to increase at the rate bx(t)y(t). Where b is a positive gain(10 marks)

i. Formulate a mathematical model for the system

ii. Draw the simulation diagram required to simulate the system on the MATLAB Simulink for a time period of 4000 seconds using the following data: r=0.001, $a=2x10^{-6}$, s=0.01, $b=10^{-6}$ and the initial population sizes x(0)=12000 and y(0)=600.

Question 4 (15 marks)

a) List the simulation software features upon which you base your decision in choosing a simulation software from several.

b) Differentiate between validation and verification processes of a simulation model

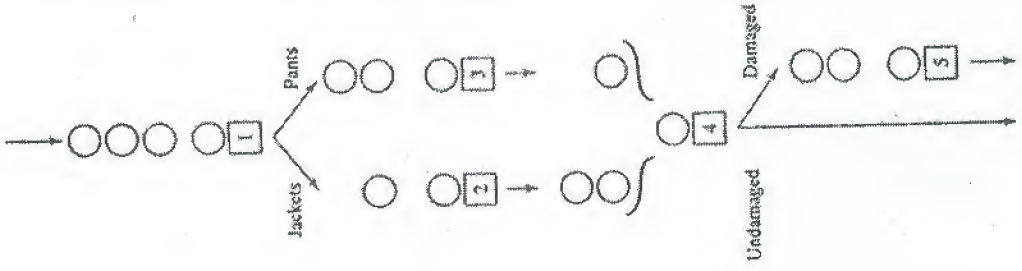
c) Give some guidelines to follow in determining the level of details required when building a simulation model for a system.

Question 4 (15 marks)

Two-piece suits are processed by a dry cleaner as follows. Suits arrive with exponential inter-arrival times having mean 10 minutes, and are all initially served by server 1, perhaps after a wait in a FIFO queue; see the figure. Upon completion of service at server 1, one piece of the suit (the jacket) goes to server 2, and the other part (the pants) to server 3. During service at server 2, the jacket has a probability of 0.05 of being damaged, and while at server 3 the probability of a pair of pants being damaged is 0.10. Upon leaving server 2, the jackets go into a queue for server 4; upon leaving server 3, the pants go into a different queue for server 4. Server 4 matches and reassembles suit parts, initiating this when he is idle and two parts from the same suit are available. If both parts of the reassembled suit are undamaged, the suit is returned to the customer. If either (or both) of the parts is (are) damaged, the suit goes to customer relation (server 5). Assume that all service times are exponential random variables. The system is initially empty and idle. Simulate the system for exactly 12 hours. Your solution should include the system state variables identification.

a) Draw the event diagram

b) Draw the flow simulation flowcharts to observe the average and maximum time in the system for each type of outcomes (damaged or not), separately, the average and maximum length of each queue, and the utilization of each server.



Good luck

Course Coordinator: Dr. Hamed Hemeda and the **Course examination committee**

Title: Modeling and Simulation
Final exam, Date: 18/6/2011, **Total marks:** 85
Course code: CCE3221 **Year:** Third year
Allowed time: 3 hours **Number of pages:** 3

Workout the following questions

Question 1 (20 marks)

Copy the following table in your answer sheet and fill it by the answers of the question items. Give the corrections for false statements

Item	a	b	c	d	e	f	g	h	i	j
(True/false)										

Determine whether each of the following statements is true or false

a) When designing a parallel processed discrete-event simulation model based on the conservative synchronization mechanism, each process is designed to run independently from the others
b) Static system is the system whose parameters/constants don't change with time
c) One of the disadvantages when designing a parallel processed discrete-event simulation model based on the optimistic synchronization mechanism is the overhead computations associated with executing rollbacks
d) Simulation is the process of numerically exercising with system model for the input in questions to see how they affect the output measures of performance without the necessity of having an analytic solution for these outputs
e) The verification of a discrete-event simulation model is the process of debugging the simulation program
f) When designing a parallel processed discrete-event simulation model based on the optimistic synchronization mechanism, the design and implementation of a process can't be worked out independently from other that may affect its execution
g) One of the disadvantages when designing a parallel processed discrete-event simulation model based on the conservative synchronization mechanism is the overhead computations associated with executing rollbacks
h) One of the advantages when designing a parallel processed discrete-event simulation model based on the conservative synchronization mechanism is that the design and implementation of a process can be worked out independently from other that may affect its execution
i) When designing a parallel processed discrete-event simulation model based on the conservative synchronization mechanism, we need to keep track of the history of individual processes
j) Simulation is the process of numerically executing the analytic solutions obtained from a system model on a computer

Tanta University
Faculty of Engineering
Computers & Automatic Control Dept.

Computer Aided Design (CAD)
2nd Sem., 2010-2011
Final Exam; 3rd year students

Answer the following questions:

1. **Explain the advantages of using "Computer Aided Design: CAD" software in the production process of different products.**

2. **For the following connectivity matrix (incidence matrix A):**

	a	b	c	d	e	f
0	1	0	0	-1	-1	-1
1	-1	1	0	0	0	0
2	0	-1	1	1	0	0
3	0	0	-1	0	1	1

   a. Get the oriented graph,
   b. Get some of the possible trees and select one to be the main tree.
   c. Get the tie-set matrix **[B]**, &
   d. Get the cut-set matrix **[D]**.

3. **A computer system is described by a Petri Net Model that is represented by the connectivity matrix as shown:**

	p_1	p_2	p_3	p_4	p_5
t_1	1	-1	0	0	0
t_2	-1	1	0	0	+-1
t_3	0	0	1	-1	+-1
t_4	0	0	-1	1	0

   a. Draw the Petri Net model; explaining each place and each transition.
   b. Suggest an algorithm that **runs** the Petri net to generate the marking graph.
   c. Get the Marking Graph that represents the dynamic behavior of the system.

4. **For the Petri net Model of question 3:**
   a. Suggest suitable Data Structures to represent the connectivity matrix, the marking graph and other needed structures.
   b. Suggest an algorithm that simulates the Run Process of the Petri net to generate the marking graph.

5. **For the computer system of question 3; if that system represents 2 processors (P_1 and P_2) and one buffer (B) with the following behavior:**
   - **the 1st processor (P_1) executes an internal task ($task_1$) and then <u>writes</u> the results into the buffer (B), and**
   - **the 2nd processor (P_2) <u>reads</u> from the buffer (B) and then executes an internal task ($task_2$).**

   a. Draw a Petri Net model that includes **two more conditions** for the buffer: buffer **<u>overflow</u>** and buffer **<u>underflow</u>**.
   b. Get the new Marking Graph that represents the correct dynamic behavior of the system.

With my best wishes

Dr. Ahmad Shehab Al-Dean

[1-a] Write short notes on :-

* SCADA systems.
* Photo electric switches.
* Criteria for choosing PLC.
* PLC programming languages.
* Internal architecture of the PLC .

[1-b] Draw a ladder diagram rungs to represent the following:

i > A solenoid valve is to be activated if there is an input signal from sensor A or B.

ii > A motor is switched on by pressing a push button START switch, and the motor remains on for 100 sec. or until another push button STOP is pressed.

[2-a] What are the differences between :

* Latch and Flag.
* On delay and Off delay timers.
* Absolute and Incremental encoders.
* Output Relay and Output Transistor.
* Inductive and Capacitive proximity switches.

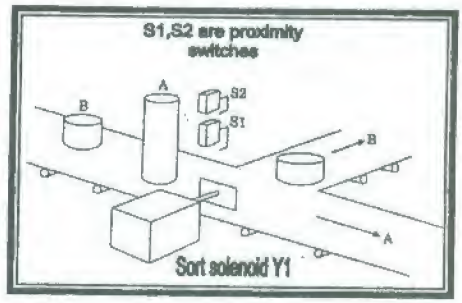
[2-b] Draw a ladder diagram that simulates the following combinational logic function.

$$F = \sum(1,3,4,5,7,8,10)$$

[3-a] Draw ladder diagrams to implement the following:-

* Up counter.
* Off delay timer .
* Pick and Place Gripper unit of robot arm.

[3-b] For the shown system draw a ladder diagram to control the detection and sorting process .



[4-a] Draw time diagram and ladder diagram that simulate a four stages sequential control production line each stage takes 5 min., the 2nd stage starts before the ending of the 1st stage by 1 min., the 3rd stage starts at the end of the 2nd stage, the 4th stage starts at the middle of the 3rd stage, and repeat this sequence at the end of the 4th stage. Using two push buttons S1and S2, S1 to start and S2 to stop the sequence.

[4-b] Devise a ladder diagram for a stamping machine. A groove is stamped into a workpiece by a pneumatic cylinder, 3 proximity sensors B1,B2,and B3 are installed for sensing the workpiece . The stamping process is to be triggered when only two proximity switches are addressed simultaneously. Also write the corresponding instruction list program.

3-

Process	Arrival Time	Service Time (T_s)
A	0	3
B	2	6
C	4	4
D	6	5
E	8	2

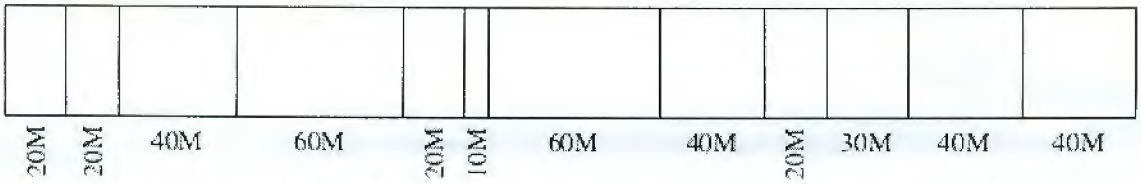
Perform three scheduling algorithm to execute the above processes

Question Five

1-What are the meaning of multi-threading and what are the benefits of it?

1- Consider an address of *(n+m)* bits, where the leftmost n bits specifies the page number and the rightmost m bits are the offset address, Illustrate, the required steps with the necessary drawing which are needed for address translation.

3- A dynamic partitioning scheme is being used, and the following is the memory configuration at a given point in time:



The shaded areas are allocated blocks; the white areas are free blocks. The next three memory requests are for 60M, 40M, and 10M. Indicate the starting address for each of the three blocks using the following placement algorithms:

a. First-fit

b. Best-fit

c. Worst-fit

With my best wishes Dr. Hatem June 2011

Tanta University

Department: **Computers and Control Engineering**
Total Marks: 120 Marks

Faculty of Engineering

Course Title: **Operating Systems Old Bylaw** Course Code: EC3204 3rd. year
Date: 14-6-2011 Allowed time: 3 hrs No. of Pages: (2)

Answer All Questions

Question One

1- What are the difficulties with concurrences?
2- How is a counting semaphore different from a binary semaphore?
3- Consider the following snapshot of a system:
Consider the following snapshot of a system (P=Process, R=Resource) :

Available			
RA	RB	RC	RD
8	5	9	7

Maximum Demand				
	RA	RB	RC	RD
P0	3	2	1	4
P1	0	2	5	2
P2	5	1	0	5
P3	1	5	3	0
P4	3	0	3	3

Current Allocation				
	RA	RB	RC	RD
P0	1	0	1	1
P1	0	1	2	1
P2	4	0	0	3
P3	1	2	1	0
P4	1	0	3	0

Answer the following questions using banker's algorithm:

a) Calculate the *Needs* matrix:
b) Is the system in a safe state? If so, show a safe order in which the processes can run? **Show your computation step-by-step;**

Question Two

1- Compare between the following: I/O programming, Interrupt driven programming and DMA?
2-What is operating system? What are its objectives and services?
3- Define the term "Processes" what does it consist? Then Draw the process image
4- Draw the two states suspend model diagram?

Question Three

1-What are the components of OS control structure?
2- What the types of registers, give an example for each type
3- The Sleeping-Barber Problem. A barbershop consists of a waiting room with n chairs and the barber room containing the barber chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs. If the barber is asleep, the customer wakes up the barber. Write a program by any computer language to coordinate the barber and the customers.

Question Four

1-What are the major criteria for short term scheduling?
2- Explain the scenario of operation for the producer /consumer problem at the two different cases (finite and infinite buffer) , then write a pseudo code to give the correct solution to the infinite buffer.

1. Write SQL queries to compute the average rating, using AVG; the sum of the ratings, using SUM; and the number of ratings, using COUNT.
2. If you divide the sum computed above by the count, would the result be the same as the average? How would your answer change if the above steps were carried out with respect to the *age* field instead of *rating*?
3. Consider the following query: *Find the names of sailors with a higher rating than all sailors with age* < 20. The following two SQL queries attempt to obtain the answer to this question. Do they both compute the result? If not, explain why. Under what conditions would they compute the same result?

```
SELECT S.sname
FROM Sailors S
WHERE NOT EXISTS ( SELECT *
                   FROM Sailors S2
                   WHERE S2.age < 20
                   AND S.rating <= S2.rating )
SELECT *
FROM Sailors S
WHERE S.rating > ANY ( SELECT S2.rating
                       FROM Sailors S2
                       WHERE S2.age < 20 )
```

The Thi d Question (10 Mark)

(a) List the Advantage and Drawback of **VIEW**.

(b) Consider base table **STAFF** as shown in Fig. 2, the view **ITSTAFF** is created from the base table STAFF. Then the view **YOUNGITSTAFF** is created from the view **ITSTAFF**.

1. Give the **SQL** syntax to define the view **ITSTAFF**, which contains only the details of the staff who belong to the **IT** department.
2. Give the **SQL** syntax to define the view **YOUNGSTAFF**, which contains only the details of **IT** staff whose age is less than 30.
3. Whether the view **YOUNGSTAFF** which is created from another view **ITSTAFF** can be queried like the base table?
4. What is the pay offered to the **YOUNGITSTAFF** Radha?
5. If it is possible to make any change in the view **ITSTAFF** which was created from the base table **STAFF**, will it reflect in the base table **STAFF**
6. Update the view **ITSTAFF** by including one row in the view **ITSTAFF**
7. If the view **ITSTAFF** is dropped, then is it possible to get the content of the view **YOUNGITSTAFF** which is derived from **ITSTAFF**?
8. Drop the view **ITSTAFF**

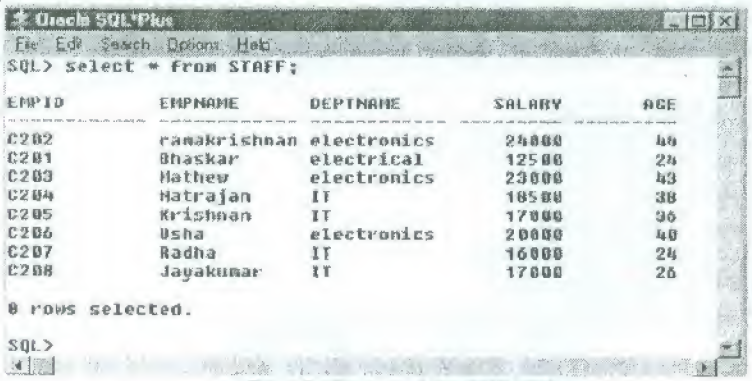


Fig. 2. Base table STAFF

The Fourth Question (10 Mark)

(a) Compare between **ON DELETE CASCADE** and **ON DELETE SET NULL** commands in SQL

(b) Consider two relation **DEPARTMENT** and **EMPLOYEE** as shown in Fig. 3 and Fig. 4. Here the **DEPARTMENT** relation forms the parent table. which contains the primary key **DeptID**. The

relation **EMPLOYEE** forms the child table that has foreign key **DID** which references to primary key in **DEPARTMENT** table.

DEPARTMENT

DeptID	Dname	Location
D100	electrical	B
D101	civil	A
D102	computer	C

Fig. 3. DEPARTMENT

EMPLOYEE

EID	DID	Ename
E201	D100	Raman
E202	D101	Ravi
E203	D101	Krishnan

Fig. 4. EMPLOYEE

1- If the clause **ON DELETE CASCADE** is included in the child table Give the syntax for **SQL** command and the corresponding output in the following cases:
   1- Declare the relations **DEPARTMENT** and **EMPLOYEE**.
   2- delete the department "**Civil**" in the **DEPARTMENT** table
2- If **ON DELETE SET NULL** clause is include in the child table Give the syntax for **SQL** command and the corresponding output in the following cases:
   1- Declare the relations **DEPARTMENT** and **EMPLOYEE**.
   2- Modify the table **DEPARTMENT** by deleting the "**electrical**" department record

With my best wishes

Tanta University
Faculty of Engineering
Department of Computer & Control Eng.
Subject: Decision Support Systems (3rd year)

Date: 28/6/2011
Time allowed: 120 Min.
Full Mark: 40 Mark
Final Term Exam (2nd Semester)

Answer The Following Questions (ملحوظة هامة: الأسئلة فى ثلاث ورقات)

The First Question (10 Mark)

State whether each of the following statements is true or false.

1. SQL is not based on relational tuple calculus.
2. SQL is a "procedural" language.
3. Application portability means applications can not be moved from machine to machine when each machine uses SQL.
4. DDL commands are used to maintain and query a database, including updating, inserting, modifying, and querying data.
5. DML commands are used to define a database, including creating, altering, and dropping tables and establishing constraints.
6. To see the description of the table we have created we have the command SELECT.
7. Selection operation can be considered as column row wise filtering.
8. The projection operation performs row wise filtering.
9. The COUNT command returns the number of rows of the relation, by eliminating duplicate values.
10. The HAVING does not restrict the groups according to a specified condition.
11. DCL commands are used to control a database including administering privileges and saving of data.
12. The GROUP BY clause is used to group rows to compute group-statistics.
13. Whenever an attribute is declared as NOT NULL then it specifies that the attribute cannot contain a NULL value.
14. The UNIQUE constraint specifies that whenever an attribute or set of attributes are specified as UNIQUE, then the values of the attribute should be unique for all the rows of the table. For example, consider the Roll number of the student in the class, every student should have UNIQUE roll number.
15. PRIMARY KEY constraint is used to identify each row of the table uniquely.
16. FOREIGN KEY constraint specifies that the value of an attribute in one table depends on the value of the same attribute in another table.
17. CHECK constraint defines a condition that each row must satisfy. Also there is no limit to the number of CHECK constraints that can be imposed on a column.
18. The UNION command removes duplicate values.
19. The intersection operation returns the tuples that are common to the two relations.
20. The database should have sound security system so that each and every transaction is carried out by an authorized user.

The Second Question (10 Mark)

(a) Give SQL statements that are required to:
   1. Specify a fixed-point number.
   2. View the entire table.
   3. Deleting Row from the Table
   4. Modifying the column of the Table.
   5. Deleting the column of the Table.

(b) Consider the instance of the Sailors relation shown in Fig. 1.

Sid	Sname	Age	rate
10	Ahmed	57	9
16	Mohamed	30	5
20	Heba	22	2
23	Hala	15	Null
35	Esam	35	7
40	Mariem	16	Null

Fig 1. An Instance of Sailors

(c) Describe the roles identified in the Chief Programmer team organization.

(d) You have been hired as a test engineer for a large mission critical system. Describe three different test methodologies.

(e) Give possible reasons that cause you (as a project manager) to reject the project and say it is not possible to develop at your company? (Give at least 4 reasons)

Problem number (4) (25 Marks)

(a) Describe the difference between functional and non-functional requirements. Give two examples of each.

(b) You are designing a system that handles login and security for an application. The basic functions of the system are:

a- The user must first enter a valid login name. The system checks to see that the name is valid before asking for a password. If it is not valid, the user can either exit (cancel) or re-enter the name.

b- The user then must enter the password associated with the name. The system validates that the password is the appropriate one for the login name. If the password is invalid, the user can either cancel and exit, re-enter the password, or go back to step (a) and re-enter the login name.

c- The user selects a function. The system validates that the function is one that the user is allowed to do. If not, the user can either exit, re-enter the function, or go back to step (a) and start the process over again.

1- Identify the following items in the given system: Source/sink, datastores and processes.
2- Draw the context diagram and level-0. You should check the balance of the two levels.

(b) Suggest at least three functions to be required in Car control (نظام تحكم فى السيارة) SW developed. Draw the conceptual model and write the description of each function in a clear way. Also, add two non-functional requirements that could be required.

Good Luck all

Tanta University

Department: Computers and Automatic Control Eng.
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Software Engineering	Course Code:	Year: 3rd
Date: June 11, 2010 (Second term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: **Please Read the question more than once to fully understand it before you start solving, Do not forget to make verification and validation for your answers.**

Problem number (1) **(25 Marks)**

(a) Software Project Management has been described as a difficult and heavy task. Why?

(b) If you are a software project manager and want to make a time plan for the new project, how would you estimate the time and number of people for each task?

(c) What are the types of maintenance? Give example for each type?

(d) "A *PERT Chart* allows a manager to determine which tasks lie on the critical path of a project." Why is this useful information? Illustrate your answer with identifying the critical nodes for the next problem using PERT chart.

Task number	Estimated time	Predecessor
1	3	--
2	5	1
3	7	1
4	4	2,3
5	2	4
6	5	5
7	6	4
8	2	6,7

Problem number (2) **(20 Marks)**

(a) Managers often use the *waterfall model* to plan a software project. Describe the waterfall model. What limitations (problems) does this model have? And when it could be used?

(b) Define software prototyping. What are the advantages and disadvantages of prototyping as a requirement analysis solution? How does prototyping fit into an incremental development process? In *throwaway prototyping*, the prototype is used to explore requirements with the customer. The prototype is discarded before the real system is built. Why do we fall into such type of prototype and how to avoid this in next projects?

(c) Define what is meant by the following software quality measurements?
i) Reliability *ii) Maintainability* iii) *Usability*

Problem number (3) **(20 Marks)**

(a) Describe each of the following modeling methods and state where each of them is used in representing the software requirements.
i) Dataflow Diagrams *ii) Entity Relationship Diagrams*

(b) Software Reuse has the advantages to decrease the cost of software development. How is this done? And how to develop your software using reusable components?

P.T.O.